CLAIM AMENDMENTS

Claim Amendment Summary

Claims pending

- Before this Amendment: Claims 1-30.
- After this Amendment: Claims 1-5, 10-14, 19-23, 28-45

Non-Elected, Canceled, or Withdrawn claims: 6-9, 15-18, 24-27, and 29-30

Amended claims: 1, 10, 19, 28

New claims: 31-45

Claims:

What is Claimed:

1. **(Currently Amended)** A method for **displaying** all-frequency relighting **of computer-generated graphic objects, comprising:**

using approximations based on an radiance accumulation derived from a combination of at least two real-time techniques; **[~~and wherein a~~]**

representing a set of low frequencies of lighting **[~~are represented~~]** with a tabulated rendering method; **[~~and~~]**

approximating high-frequency energy **[~~is approximated~~]** with an on-the-fly method;

segmenting a lighting environment into a plurality of regions;

prioritizing each of the plurality of regions for subsequent extraction and approximation with a plurality of small analytic light

sources, wherein said element of prioritizing each of the plurality of regions for subsequent extraction and approximation with point light sources comprises is based on high-frequency energy reduction;

allocating one or more point samples to each of said plurality of regions; and

displaying the computer-generated graphic objects.

2. (Original) The method of claim 1 wherein a set of low frequencies of lighting are represented with a precomputed radiance transfer (PRT) technique and high-frequency energy is approximated with a plurality of point lights.

3. (Original) The method of claim 0 wherein a set of low frequencies of lighting is rendered using a spherical harmonics technique.

4. (Original) The method of claim 0 wherein a set of high frequencies of lighting is rendered using a shadow map technique.

5. (Original) The method of claim 0 wherein a set of high frequencies of lighting is rendered using a shadow volumes technique.

6. (Canceled)

7. (Canceled)

8. (Canceled)

9. (Canceled)

10. (Currently Amended) A system for **displaying** all-frequency relighting **of computer-generated graphic objects,** comprising:

a subsystem for determining approximations based on an radiance accumulation derived from a combination of at least two real-time techniques **[~~comprising:~~];**

a subsystem for representing a set of low frequencies of lighting with a tabulated rendering method; **[~~and~~]**

a subsystem for approximating high-frequency energy using an on-the-fly method;

a subsystem for segmenting a lighting environment into a plurality of regions;

a subsystem for prioritizing each of the plurality of regions for subsequent extraction and approximation with a plurality of small analytic light sources, wherein said subsystem for prioritizing each of the plurality of regions for subsequent extraction and approximation with point light sources utilizes a high-frequency energy reduction technique;

a subsystem for allocating one or more point samples to each of said plurality of regions; and

a subsystem for displaying the computer-generated graphic objects.

11. (Original) The system of claim 10 further comprising a subsystem for representing a set of low frequencies of lighting with precomputed radiance

transfer (PRT) and a subsystem for approximating high-frequency energy with a plurality of point lights.

12. **(Original)** The system of claim 11 further comprising a subsystem using a spherical harmonics technique to render a set of low frequencies of lighting.

13. **(Original)** The system of claim 11 further comprising a subsystem using a shadow map technique to render a set of high frequencies of lighting.

14. **(Original)** The system of claim 11 further comprising a subsystem using a shadow volumes technique to render a set of high frequencies of lighting.

15. **(Canceled)**

16. **(Canceled)**

17. **(Canceled)**

18. **(Canceled)**

19. **(Currently Amended)** A computer-readable medium **storing** **[~~comprising~~]** computer-readable instructions for **displaying** all-frequency relighting **of computer-generated graphic objects,** **[~~using approximations based on an radiance accumulation derived from a~~**

~~combination of at least two real-time techniques,~~] said computer readable instructions comprising instructions for:

using approximations based on an radiance accumulation derived from a combination of at least two real-time techniques;

representing a set of low frequencies of lighting with a tabulated rendering method; [~~and~~]

approximating high-frequency energy with an on-the-fly method;

segmenting a lighting environment into a plurality of regions;

prioritizing each of the plurality of regions for subsequent extraction and approximation with a plurality of small analytic light sources, whereby said element of prioritizing each of the plurality of regions for subsequent extraction and approximation with point light sources comprises is based on high-frequency energy reduction;

allocating one or more point samples to each of said plurality of regions; and

displaying the computer-generated graphic objects.

20. (Original) The computer-readable instructions of claim 19 further comprising instructions whereby a set of low frequencies of lighting are represented with a precomputed radiance transfer (PRT) technique and high-frequency energy is approximated with a plurality of point lights.

21. (Original) The computer-readable instructions of claim 20 further comprising instructions whereby a set of low frequencies of lighting is rendered using a spherical harmonics technique.

22. **(Original)** The computer-readable instructions of claim 20 further comprising instructions whereby a set of high frequencies of lighting is rendered using a shadow map technique.

23. **(Original)** The computer-readable instructions of claim 20 further comprising instructions whereby a set of high frequencies of lighting is rendered using a shadow volumes technique.

24. **(Canceled)**

25. **(Canceled)**

26. **(Canceled)**

27. **(Canceled)**

28. **(Currently Amended)** A hardware control device for **displaying** all-frequency relighting **of computer-generated graphic objects** using approximations based on an radiance accumulation derived from a combination of at least two real-time techniques, said device comprising:

means by which a set of low frequencies of lighting are represented with a precomputed radiance transfer (PRT) technique and high-frequency energy is approximated with a plurality of point lights;

means by which a set of high frequencies of lighting is rendered using one of a set of techniques, said set of techniques comprising: a shadow map technique, and a shadow volumes technique

means for segmenting a lighting environment into a plurality of strata regions;

means for prioritizing each of the plurality of regions for subsequent extraction and approximation with a plurality of small analytic light sources, wherein said means for prioritizing each of the plurality of regions for subsequent extraction and approximation with point light sources comprises means employing a technique based on one of the following sets of techniques: a high-frequency energy reduction technique or an iterative algorithm for a background estimation technique;

means for allocating one or more point samples to each of said plurality of regions; and

means for displaying the computer-generated graphic objects.

29. (Canceled)

30. (Canceled)

31. (New) A method for displaying all-frequency relighting of computer-generated graphic objects, comprising:

using approximations based on an radiance accumulation derived from a combination of at least two real-time techniques;

representing a set of low frequencies of lighting with a tabulated rendering method;

approximating high-frequency energy with an on-the-fly method;

segmenting a lighting environment into a plurality of regions;

prioritizing each of the plurality of regions for subsequent extraction and approximation with a plurality of small analytic light sources, wherein said element of prioritizing each of the plurality of regions for subsequent extraction and approximation with point light sources comprises is based on an iterative algorithm for a background estimation;

allocating one or more point samples to each of said plurality of regions; and

displaying the computer-generated graphic objects.

32. (New) The method of claim 31 wherein a set of low frequencies of lighting are represented with a precomputed radiance transfer (PRT) technique and high-frequency energy is approximated with a plurality of point lights.

33. (New) The method of claim 32 wherein a set of low frequencies of lighting is rendered using a spherical harmonics technique.

34. (New) The method of claim 32 wherein a set of high frequencies of lighting is rendered using a shadow map technique.

35. (New) The method of claim 32 wherein a set of high frequencies of lighting is rendered using a shadow volumes technique.

36. (New) A system for displaying all-frequency relighting of computer-generated graphic objects, comprising:

a subsystem for determining approximations based on an radiance accumulation derived from a combination of at least two real-time techniques;

a subsystem for representing a set of low frequencies of lighting with a tabulated rendering method;

a subsystem for approximating high-frequency energy using an on-the-fly method;

a subsystem for segmenting a lighting environment into a plurality of regions;

a subsystem for prioritizing each of the plurality of regions for subsequent extraction and approximation with a plurality of small analytic light sources, wherein said subsystem for prioritizing each of the plurality of regions for subsequent extraction and approximation with point light sources utilizes an iterative algorithm for a background estimation technique;

a subsystem for allocating one or more point samples to each of said plurality of regions; and

a subsystem for displaying the computer-generated graphic objects.

37. (New) The system of claim 36 further comprising a subsystem for representing a set of low frequencies of lighting with precomputed radiance transfer (PRT) and a subsystem for approximating high-frequency energy with a plurality of point lights.

38. (New) The system of claim 37 further comprising a subsystem using a spherical harmonics technique to render a set of low frequencies of lighting.

39. (New) The system of claim 37 further comprising a subsystem using a shadow map technique to render a set of high frequencies of lighting.

40. (New) The system of claim 37 further comprising a subsystem using a shadow volumes technique to render a set of high frequencies of lighting.

41. (New) A computer-readable medium storing computer-readable instructions for displaying all-frequency relighting of computer-generated graphic objects, said computer readable instructions comprising instructions for:

using approximations based on an radiance accumulation derived from a combination of at least two real-time techniques;

representing a set of low frequencies of lighting with a tabulated rendering method;

approximating high-frequency energy with an on-the-fly method;

segmenting a lighting environment into a plurality of regions;

prioritizing each of the plurality of regions for subsequent extraction and approximation with a plurality of small analytic light sources, whereby said element of prioritizing each of the plurality of regions for subsequent extraction and approximation with point light sources comprises is based on an iterative algorithm for a background estimation;

allocating one or more point samples to each of said plurality of regions; and

displaying the computer-generated graphic objects.

42. (New) The computer-readable instructions of claim 41 further comprising instructions whereby a set of low frequencies of lighting are represented with a precomputed radiance transfer (PRT) technique and high-frequency energy is approximated with a plurality of point lights.

43. (New) The computer-readable instructions of claim 42 further comprising instructions whereby a set of low frequencies of lighting is rendered using a spherical harmonics technique.

44. (New) The computer-readable instructions of claim 42 further comprising instructions whereby a set of high frequencies of lighting is rendered using a shadow map technique.

45. (New) The computer-readable instructions of claim 42 further comprising instructions whereby a set of high frequencies of lighting is rendered using a shadow volumes technique.